ABSTRACT

Optimal Decision Feedback Equalizer (DFE) coefficients are determined from a channel estimate h by casting the DFE coefficient problem as a standard recursive least squares (RLS) problem, e.g., the Kalman gain solution to the RLS problem. A fast recursive method, e.g., fast transversal filter (FTF) technique, for computing the Kalman gain is then directly used to compute Feed Forward Equalizer (FFE) coefficients g_{opt}. The complexity of a conventional FTF algorithm is reduced to one third of its original complexity by choosing the length of a Feed Back Equalizer (FBE) coefficients b_{opt} (of the DFE) to force the FTF algorithm to use a lower triangular matrix. The FBE coefficients b_{opt} are then computed by convolving the FFE coefficients g_{opt} with the channel impulse response h. In performing this operation, a convolution matrix that characterizes the channel impulse response h extended to a bigger circulant matrix. With the extended circulant matrix structure, the convolution of the FFE coefficients g_{opt} with the channel impulse response h may be performed in the frequency domain, which can be computed efficiently using the Fast Fourier Transform (FFT).